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Research on the Innovative Application of E-commerce Supply Chain Management Based on AIGC

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Abstract

Abstract Innovative applications based on AIGC have injected new vitality into e-commerce supply chain management, which not only greatly improves operational efficiency. However, the application of AIGC technology in e-commerce supply chain management also faces challenges. with the continuous progress of the technology, how to continuously optimize the AIGC model to adapt to the ever-changing market environment is also a key concern for e-commerce enterprises. This paper starts from the basic principles of AIGC technology, discuss in depth its application cases in e-commerce supply chain management, analyses the advantages and challenges it brings, and look forward to the future development trend, with a view to providing references and inspirations for the research and practice in related fields.

Keywords: AIGC, SCM, Cross-border E-commerce, Digital Innovation, New Quality Productivity (NQP)

1. Introduction

With the rapid development of artificial intelligence and big data technology, the field of e-commerce supply chain management is ushering in a profound technological change. Innovative applications based on AIGC (Artificial Intelligence Generated Content) have injected new vitality into e-commerce supply chain management, which not only greatly improves operational efficiency, but also brings unprecedented intelligent experience to enterprises. In such a context, exploring the application of AIGC in e-commerce supply chain management and its potential impact has become a topic worthy of in-depth study [1].

Artificial Intelligence Generated Content (AIGC) is a service that uses artificial intelligence to automate the process of creating information while meeting the personalized needs of consumers [2]. The core of AIGC lies in the use of artificial intelligence algorithms to automatically generate content (GAI), which includes, but is not limited to, a wide range of formats including, but not limited to, text, images, audio and video [10]. In e-commerce supply chain management, this technology can be used in a variety of ways, such as intelligent forecasting, inventory optimization, demand analysis, risk assessment, etc., to enable more accurate and efficient decision support.

However, the application of AIGC technology in e-commerce supply chain management also faces challenges. Data security and privacy protection are urgent issues that need to be resolved, while the popularization and application of the technology requires the joint collaboration and adaptation of all parties in the supply chain [9]. In addition, with the continuous progress of the technology, how to continuously optimize the AIGC model to adapt to the ever-changing market environment is also a key concern for e-commerce enterprises.

2. Innovative Application of AIGC in E-commerce SCM

2.1 Intelligent Recommender System

Firstly, through deep learning algorithms and big data analysis, AIGC is able to automatically generate personalized content, including product descriptions and marketing copy, which can be customized based on a user's browsing history, purchasing habits and personal preferences, so as to improve the relevance and attractiveness of recommendations. This technology can help e-commerce platforms better understand consumer needs and thus provide more accurate product recommendations [2]. This not only improves the user's shopping experience, but also helps e-commerce platforms realize precision marketing and increase sales.

Secondly, AIGC is also capable of generating diversified media content, such as images, videos, etc., which can be used for merchandise display and promotion to enhance users' shopping experience [3]. For example, AIGC can generate personalized main pictures, detail pages, etc. based on users' interests and behaviours, making the display of goods more vivid and attractive.

Further, AIGC technology can also be applied in the field of customer service, through natural language processing and machine learning technology, to achieve intelligent customer service robots, providing 24/7 consulting services, answering customers' questions and even making personalised recommendations. This not only improves customer service quality, but also greatly improves efficiency [4].

Please refer to Fig.1 to see how AIGC intelligent recommendation process worked.

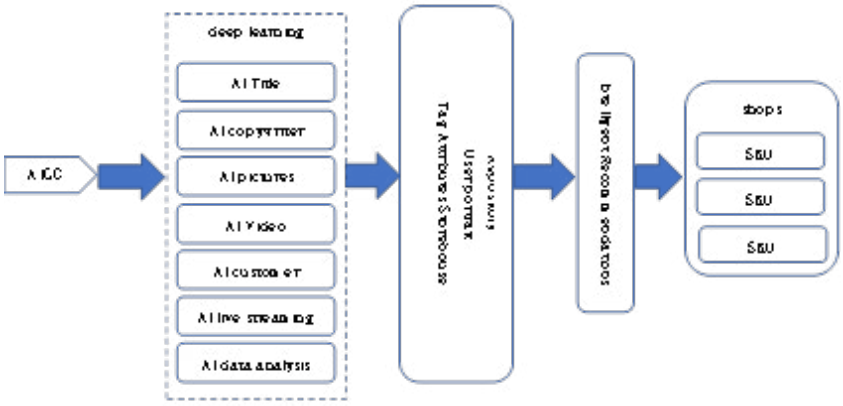

Figure 1: AIGC Intelligent Recommendation Process

2.2 Supply Chain Optimization Management

AIGC technology can monitor real-time data of each link in the supply chain, such as inventory, order quantity, logistics information, etc., to help enterprises predict market demand, optimise inventory structure and improve logistics efficiency [5]. In addition, AIGC can assist enterprises to achieve transparent management of the supply chain and reduce operational risks.

AIGC not only optimizes transport routes, but also predicts traffic conditions and automatically adjusts last-mile delivery schedules to cope with unexpected events. This not only reduces transport costs, but also ensures that goods arrive on time for delivery, thus improving the overall reliability of the supply chain [6]. AIGC can also optimize warehouse layouts. During the supply chain management process, AIGC can identify the most frequently visited items and suggest that they be placed close to the packing center or forwarding center [7]. Amazon's operations centers have pioneered the use of this technology and have successfully optimized warehouse layouts. In traditional warehouse environments, where layouts are often static and designed based on historical data and infrequent evaluations, AIGC can dynamically adjust the layout of the warehouse, arranging parts and products according to specific criteria such as dimensions or alphabetical order [8]. Apart from that, AIGC can simulate the configuration of the various parameter criteria and their impact on the running time in the warehouse. The difference between AIGC-driven supply chains and traditional supply chains can been seen in Table 1 down below.

Differences between AIGC-driven supply chains and traditional supply chains	
Traditional Supply Chain Operations	AIGC-driven supply chain operations
Reactivity: Traditional supply chains react to changes in demand, supply disruptions or logistical challenges.	Proactive: AIGC can anticipate these changes before they happen Making companies proactive rather than reactive is a huge shift.
Static Planning: Traditional supply chain operations rely on static planning models that do not change unless manually updated.	Dynamic optimisation: AIGC Logistics introduces dynamic optimisation. It constantly learns and adapts to new data to optimise operations in real time.
Manual analysis: Previously, data analysis was often manual, time-consuming and prone to human error.	Automated Insight Generation: The supply chain under AIGC can automatically generate insights to process large amounts of data faster and more accurately.
Generic solutions: Traditional supply chains often implement one-size-fits-all solutions that are not optimal.	Customised Strategies: AIGC-enabled supply chains can customise strategies to address the unique challenges and opportunities of each supply chain.

Table 1: Differences between AIGC-driven Supply Chains and Traditional Supply Chains

2.3 Risk Control and Credit Assessment

In e-commerce transactions, risk control and credit assessment are crucial. AIGC technology can analyse transaction data, user behaviour and other information to assess transaction risks and provide decision support for e-commerce platforms [11]. Meanwhile, AIGC can also help e-commerce platforms establish a credit system and improve transaction security. In supply chain management, the credit assessment of partners is crucial, and AIGC technology can use machine learning algorithms to analyse information such as suppliers' historical transaction data, performance and market reputation to provide merchants with more accurate credit scores and ratings [12]. This helps businesses choose more reliable partners and reduce transaction risk due to credit issues.

3. Advantages of AIGC in E-commerce SCM

3.1 Improving Supply Chain Efficiency

AIGC technology can analyse supply chain data in real time, helping enterprises to respond quickly to market changes and improve supply chain flexibility and responsiveness [13]. AIGC can analyse historical sales data and market trends, helping enterprises to more accurately forecast product demand, thus optimising inventory levels and reducing excess or out-of-stock situations, demand forecasting and inventory management. Through AIGC technology logistics optimisation, enterprises are able to optimise distribution routes and times, predict traffic conditions, achieve more efficient transportation and distribution of goods, and reduce logistics costs [14]. In terms of supply chain collaboration, AIGC can promote information sharing and collaborative work among various links in the supply chain, improving the responsiveness and flexibility of the entire supply chain.

3.2 Reduced Operating Costs

By optimizing inventory structure, improving logistics efficiency and other measures, AIGC technology can help enterprises reduce operating costs and improve profitability [15]. AIGC technology can automate many repetitive and time-intensive tasks, reducing reliance on manual operations and thus lowering labour costs. The application of AIGC technology in the cross-border e-commerce sector can significantly reduce operating costs and improve efficiency, especially in the traffic markets where the dividend is fading, such as the U.S. market. By automating common questions and tasks, AIGC reduces reliance on manual customer service, thereby reducing labour costs.

3.3 Optimising Customer Service

AIGC technology can provide e-commerce platforms with personalised recommendation services to improve customer satisfaction and loyalty. AIGC can provide multilingual intelligent customer service, achieve 24-hour fast and timely response, understand customer questions and provide accurate answers through natural language processing technology, generate real-time replies, and maintain a fast response time even during peak hours, reducing customer waiting time and improving customer satisfaction. At the same time, it can optimise the user shopping experience through intelligent recommendation and personalised search, increase conversion rate and reduce marketing costs. AIGC can cross language barriers and provide services to customers with different language backgrounds, thus broadening the scope of services. AIGC can analyses the emotional tendency of customers' feedback and help enterprises better understand customers' needs and dissatisfaction points, so as to provide more targeted services. AIGC technology can be AIGC technology can be used to generate virtual assistants and digital people to provide a richer and more interactive customer service experience [16].

3.4 SCM Benefits from AIGC

A comprehensive summary of how the supply chain can benefit from the use of Artificial Intelligence in Generative Computing (AIGC) in the four major areas of Supply Chain Management and Operations, Purchasing, Manufacturing, and Logistics is shown in Table 2 below:

AIGC Engine	
Functionality	**Number of Times**
Enabling Intelligent Decision Making	30 million times
Copy generation	Four million times.
Category Recommendation	Seven million times.
Category Match Evaluation	Ten million.
Email Sorting Optimisation	300,000 entries
Generate advertising keywords	Three million.
Purchase price optimisation and sourcing information analysis	600,000 entries

Table 2: Wakai Ebay 2023 Annual Data

In short, AIGC improves supply chain efficiency, reduces operating costs and optimises customer service from three aspects. It is a path for digital innovation in e-commerce supply chain empowered by new quality productivity.

3.5 Practical Case Studies of AIGC in E-commerce

Cross-border e-commerce is of a retail business that widely applies AI technology, and most listed cross-border e-commerce companies attach importance to investment in AI technology. Huakai Yibai - a cross-border B2C Amazon big seller, started developing the AIGC

system in 2020, which has significantly improved profitability and efficiency, and achieved revenue growth for 9 consecutives years. AI's ability to improve efficiency is distinctly embodied in Huakai Yibai. The number of goods on sale in Huakai Yibai exceeds 1 million, and it is profitable through the scale effect. The huge volume of products in the traditional retail industry is simply unimaginable, but the inventory turnover rate of Huakai Yibai reached 5.70 times/year, and the gross profit margin of the e-commerce business was 40.15 per cent. Such data can only be achieved under strict cost control and extreme efficiency. To be able to do this, the AI system is a credit to the company. With the Ebay Cloud system, it can handle tens of thousands of product listings in a minute. in terms of stock preparation and advertising, AI plays a role that is difficult to replace by human beings. By analysing big data, it gives scientific advice on stock preparation; the advertising system achieves stronger advertising effects with lower costs. With the support of AI, Huakai Yibai grew steadily in 2023, with revenue reaching 6.518 billion yuan, up 47.56%, and net profit of 332 million yuan, up 53.08%. The in-depth application of AI technology will continue to unleash new growth potential for cross-border e-commerce enterprises.

4. Implementation Strategies and Recommendations

4.1 Strengthening Technology Development and Application

From the perspective of digital innovation, enterprises should increase R&D investment in AIGC technology and actively explore its innovative application in e-commerce supply chain management. At the same time, they should strengthen cooperation with universities and research institutions to jointly promote the development and application of AIGC technology.

4.2 Improvement of Data Infrastructure

From the perspective of technology chain, enterprises should establish a perfect data infrastructure to ensure the accuracy and real-time of supply chain data. Establish a consumer big data model, including character portraits, purchase trajectories, and consumption label attributes, to identify problems and opportunities in the supply chain through data analysis and mining, and provide strong support for decision-making.

4.3 Strengthening the Training and Introduction of Talents

From the perspective of talent chain, enterprises should strengthen the cultivation and introduction of AIGC technical talents and establish a technical team with professional knowledge and practical experience. At the same time, it should strengthen communication and cooperation with other industries. The state and society should also vigorously develop composite digital application talents, and the enterprise and social levels should jointly promote the application and development of AIGC technology in e-commerce supply chain management.

5. Conclusion

AIGC technology has revolutionized e-commerce supply chain management. Through the innovative application of intelligent recommendation system, supply chain optimization management, risk control and credit assessment, AIGC technology helps to improve supply chain efficiency, reduce operating costs, optimize customer service and other aspects [17]. In the future, with the continuous development and improvement of AIGC technology, its application in e-commerce supply chain management will be more extensive and in-depth.

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